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G93-1157 Testing Irrigation Water

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Testing Irrigation Water

This NebGuide explains some of the reasons irrigation water should be tested and provides guidelines for collecting and submitting water samples.

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All irrigation water contains essential plant nutrients. These nutrients are free bonuses from a crop production standpoint. However, some nutrients can be present in amounts that will be **toxic** or **damaging** to crop growth. The nutrient content of Nebraska irrigation water **can be highly variable** from one location to another.

The purpose of this guide is to provide guidelines for collecting and submitting irrigation water samples to laboratories for analysis. Reasons for having irrigation water tested are discussed. The University of Nebraska Department of Agronomy Soil and Plant Analytical Laboratory (SPAL) and other laboratories listed in NebGuide *G89-907, Water Testing Laboratories* (available from your county Extension agent), will analyze your water.

Know what your Water Contains

Irrigation water quality can affect all irrigationd crop, fruit and vegetable production. All ground and surface waters contain dissolved mineral salts of various kinds and quantities. A laboratory analysis will provide information on irrigation water quality. Most irrigation water analyses will include: sodium adsorption ratio (SAR); total dissolved solids as measured by electrical conductivity of the water (EC [W]); concentration of specific anions, especially bicarbonate, chloride and sulfate; concentrations of specific cations, especially sodium, magnesium and calcium; and pH value of the water.

The most common irrigation water quality problems are caused by excessive amounts of salt (salinity) and sodium (alkali). Besides being toxic to crop growth, excess salt can restrict the capability of plants to extract sufficient water from the soil. Excessive amounts of sodium can cause soil particles to disperse, thereby destroying soil structure and restricting the movement of water and air through the soil.

Some water may contain sufficient chloride and bicarbonate to cause damage to certain crops when applied through sprinkler systems. Often when these hazards exist, problems are avoided by developing appropriate management practices. See NebGuide *G77-328, Irrigation Water Quality Criteria,* for a more detailed discussion of water quality.

The plant nutrient content of irrigation water can be an economic factor in the soil fertility management plan. Irrigation water should be tested for calcium, magnesium, potassium, manganese, sulfate, nitrate, phosphate and boron. Groundwater also contains iron; however, iron in water is not available to plants. Other nutrients in irrigation water are just **as available to the crop** as those applied in commercial fertilizers.

The mineral/nutrient content of groundwater varies with location, so each individual well should be analyzed. The concentration of most minerals/nutrients in groundwater changes very little from year to year **except** for nitrate-nitrogen (NO_3-N). Thus, for nutrients other than NO_3-N, analysis of irrigation water approximately every 10 years is sufficient. However, NO_3-N concentration can vary from year to year in the same well and between wells in the same field. This variation occurs because of nitrogen and irrigation management practices, soil type, depth of the water table and fluctuations in precipitation. The potential for variation is greatest in sandy soils with shallow water tables. Because of the above factors, NO_3-N concentration in irrigation water can vary by 10 ppm or more within short distances (even within the same quarter section). In some areas NO_3-N in ground water is sufficient to supply the total N requirement for a crop. Therefore, testing irrigation water for NO_3-N may need to be done yearly.

Testing for hardness of water can determine the compatibility of fertilizer and pesticides with irrigation water for chemigation. Some tests may also provide information about possible corrosion problems with equipment.

Plugging of well screens is a problem in some areas of the state. Plugging may reduce pumping capacity. Water analysis may be of some help in determining cause and treatment. To request information concerning a particular plugging problem, you can contact a commercial laboratory, a licensed well driller, an Extension Irrigation Specialist, the University of Nebraska Conservation and Survey Division, or the Department of Agronomy SPAL, about possible water analyses.

How to Collect Water Samples

There are two important factors to remember when collecting water samples: avoid contamination of the sample with any foreign material, and make sure the sample represents the supply and arrives at the laboratory unchanged.

1. Use a clean plastic container (most laboratories will furnish containers and sampling instructions). **RINSE SEVERAL TIMES unless the sampling instructions specifically say not to rinse** with the water being sampled. Be certain the cap or lid is also clean. Follow any sampling instructions on the size of the sample, but send in at least a pint. If the sample cannot be sent immediately after collection, then freeze it before sending to the laboratory.

2. Wells should be pumped at least 24 hours before sampling. It is best to sample irrigation wells during the peak of the pumping season.

3. Dependable sampling of irrigation test wells can be done only after a pipe and screen is installed and after pumping out all water added during the drilling operation (ideally for at least 24 hours).

The screen or sandpoint is best placed near the lower part of the water-bearing formation, since the salt content is usually highest at that level.

4. Samples of lakes, streams or ponds should be taken from below the surface where possible.

5. **An analysis for iron** requires a separate sample. Accurate iron tests can be made only if the sample is acidified immediately. If needed, most laboratories can provide a container with sufficient acid added to acidify the sample. Contact your county Extension agent for instructions, or request instructions when submitting a sample for one of the standard irrigation water tests.

County Extension agents can provide a **REQUEST FOR ANALYSIS** form that should accompany any samples submitted to the University of Nebraska Department of Agronomy SPAL.

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